

國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

科目名稱：微積分【財管系碩士班甲組】

—作答注意事項—

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請斟酌作答。
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- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

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選擇題(單選 一題 5 分)

1. 請問以下何者是錯誤的敘述?
 - A. 積分符號“ \int ”是一個拉長的 S，代表 Summation 也就是加總求和的意思
 - B. 微分符號“ dx ”的作用是在 x 上分割求差，所以 d 代表 difference
 - C. ∞ 或無限大是一個無限大的數，屬於實數集
 - D. 所有正整數的數目與所有正偶數的數目一樣多
 - E. 以上皆為錯誤
2. 請問以下何者是正確的敘述?
 - A. 世界上存在一個最小的正數，我們就叫它 $\varepsilon > 0$
 - B. “對妳(你)的愛是實數集，妳(你)有理，或無理，我全部包容”這首詩可以用符號換成：“對妳(你)的愛是 \mathbb{R} ，妳(你) \mathbb{Q} ，或 \mathbb{Z} ，我全部包容”
 - C. 畢達哥拉斯他相信一個線段只可以被有限地分段，而分段後的最小長度 > 0
 - D. 目前我們所使用的微積分符號多來自微積分創造者之一的牛頓
 - E. 以上皆為正確
3. 請問以下何者是錯誤的敘述?
 - A. 定積分 $\int_0^2 3 dx$ 相當於在求一個三角形面積
 - B. 在歐幾里得的幾何原本中，一個點只有位置沒有長度，一條線段有長度並且寬度 $= 1$
 - C. 著名的斐波納契數列 $\{0, 1, 1, 2, 3, 5, 8, \dots\}$ 為人造數列，不存在於自然界中
 - D. 函數 2^x 的微分是 $x2^{x-1}$
 - E. 以上皆為錯誤
4. 請問以下何者是正確的敘述?
 - A. 雙變數函數圖形中可能出現的鞍點為一理論值，在自然界中沒有對應的例子存在
 - B. 我們可以用根號函數 \sqrt{x} 與自然對數函數 $\ln x$ 形容經濟學的效用函數 (Utility Function)
 - C. 當求極限 $\lim_{h \rightarrow 0} \left(\frac{e^h - 1}{h} \right)$ 得到 $0/0$ 時，我們沒有其他方法可以克服只能說無意義
 - D. $\int \ln x dx = 1/x$
 - E. 以上皆為正確

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5. 以下何者所代表的意義與其他選項不同？

- A. 函數 $f(x)$ 為 concave
- B. $f(E[X]) \geq E[f(X)]$, 其中 $E[X]$ 為變數 X 的期待值
- C. $f(x) = \ln x, x > 0$
- D. $\ln(A.M.(X)) \geq A.M.(\ln(X))$, 其中 $A.M.(X)$ 為 $X = \{x_1, x_2, \dots, x_n\}$ 的數值平均 (Arithmetic Mean)
- E. 以上皆相同

6. 以下何者是正確的敘述？

- A. 一個連續的函數必定是可微分
- B. 在黎曼和 (Riemann Sum) 的計算中, 我們必須選取矩形底邊 Δx 的左端點, 若選取中點或右端點則所求出的黎曼和會有不同的極限值
- C. 微分的乘積律與連鎖律均有相對應的積分技巧, 例如從連鎖律可得出部分積分法 (Integration by Parts)
- D. 連續函數的中間值定理 (Mean Value Theorem) 只具有圖形上的幾何性質, 與微分基本定理無太大關聯
- E. 以上皆為錯誤

申論題 (10 分):

在電影那些年我們一起追的女孩中, 有句台詞:

“我敢跟妳賭, 十年後, 我連 \log 是什麼都不知道, 照樣活得很好。”

請說明:

- (1) 自然對數函數的發明解決了人類關於計算的甚麼問題? (2.5 分)
- (2) 從財管系研究生的角度, 舉出三個自然對數函數在商業上, 或在經濟學, 投資學或統計學等領域的應用. (7.5 分)

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計算題一 (20 分, 每小題 4 分):

求以下的極限

(1)

$$\lim_{x \rightarrow \infty} \left(\frac{\ln x}{x} \right)$$

(2)

$$\lim_{x \rightarrow \infty} (e^{-x} x^2)$$

(3)

$$\lim_{x \rightarrow 0^+} x \ln x$$

(4)

$$\lim_{x \rightarrow 0^+} x^x$$

(5)

$$\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x} \right)^x$$

計算題二 (20 分, 每小題 5 分):

經由以下的步驟證明

$$f(x) = \ln x, \quad x > 0 \Rightarrow f'(x) = 1/x$$

(1) 對 $f(x) = \ln x$ 寫出微分的定義公式 $f'(x) = \lim_{h \rightarrow 0} (A)$. 請寫出 $A = ?$

(2) 改寫 (1) 的結果為:

$$f'(x) = \left(\frac{1}{x} \right) \lim_{h \rightarrow 0} (B)$$

請寫出 $B = ?$

(3) 證明 $\lim_{h \rightarrow 0} (B) = 1$

(4) 在 (3) 中, 我們運用了求極限與取自然對數可以互換的性質:

$$\lim \ln() = \ln \lim()$$

請問我們可以這樣做的原因為何?

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計算題三 (20 分, 每小題 4 分):

若一隨機變數 X 有 lognormal distribution, 代表 $\ln X$ 為常態分配:

$$\ln X \sim N(\mu, \sigma^2)$$

$$\Rightarrow z = \frac{\ln X - \mu}{\sigma} \sim N(0, 1)$$

令 $F_{N(0,1)}$ 與 $f_{N(0,1)}$ 表示標準常態分配的累積分布函數與機率密度函數, 並已知 $F'_{N(0,1)} = f_{N(0,1)}$.

(1) 請由以下步驟求出 X 的機率密度函數 $f_X(x)$, 以 $f_{N(0,1)}$ 表示:

$$f_X(x) = \frac{d}{dx} \Pr(X \leq x) = \frac{d}{dx} \Pr(\ln X \leq \ln x) = ?$$

(2) 請說明在上式中第二個等號成立的原因.

(3) 假設股價 S 在時間 $t = T$ 有 lognormal distribution:

$$\ln S \sim N\left(\ln S(0) + \left(r - \frac{1}{2}\sigma^2\right)T, \sigma^2 T\right)$$

其中 $S(0)$ 為 $t = 0$ 的價格視為已知, r 為無風險利率, σ 股價波動率, 與 T 均視為常數. 請由 (1) 得出 $f_S(s) = ?$ 同樣以 $f_{N(0,1)}$ 表示.

(4) 使用變數轉換 ($S \rightarrow z$) 將以下積分改寫:

$$\int_0^\infty S f_S(s) ds = \int_{(C)}^{(D)} (E) dz$$

請寫出 $C = ? D = ? E = ?$ 答案 E 請化簡到最後結果. 其中 $z \sim N(0, 1)$, 亦即:

$$f_{N(0,1)}(z) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}z^2\right)$$

(5) 求出在 (4) 中的積分

$$\int_{(C)}^{(D)} (E) dz = ?$$

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科目名稱：經濟學【財管系碩士班乙組】

— 作答注意事項 —

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科目名稱：經濟學【財管系碩士班乙組】

題號：443004

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- 一，選擇題：單選。1-16 題為個體經濟部分，每題 2.5 分；17-26 題為總體經濟部分，每題 3 分
1. Which of the following is NOT a prediction of marginal utility theory?
 - A. Other things being equal, the higher the price of a good, the lower is the quantity demanded.
 - B. Other things being equal, the higher the price of a good, the higher is the consumption of substitutes for that good.
 - C. The “equilibrium” in the real world means that households have spent their incomes in such a way that their overall satisfaction is maximized.
 - D. If two households have identical preferences but different incomes, the wealthier one will have lower satisfaction for most goods.
 - E. The rational spending rule.
 2. A 1 percent increase in the price of good X results in a 2 percent increase in the quantity demanded of good Y. A 1 percent increase in the price of good Y will result in an increase in the quantity demanded of good Y that is:
 - A. 0.5 percent
 - B. 2 percent
 - C. Less than 0.5 percent
 - D. 1 percent
 - E. Indeterminate from the information given
 3. If a sales tax is imposed on a good produced by an industry which exhibits increasing costs and demand is not perfectly inelastic, then:
 - A. The price (including the tax) received by the producer decreases.
 - B. The price to the consumer rises by more than the tax.
 - C. The price to the consumer rises by the tax.
 - D. The price to the consumer rises by less than the tax.
 - E. The price received by the producer remains unchanged.
 4. Suppose that an individual receives utility from the consumption of X, Y, Z. We have learned that $U(X, Y, Z) = 5 \log(X) + 3 \log(Y) + 2 \log(Z)$. If the individual has \$100 to spend on these items and the prices of the items are 10, 2, and 4 for X, Y, and Z, respectively. The individual will consume:
 - A. X=5, Y=5, Z=10
 - B. X=6, Y=10, Z=5
 - C. X=4, Y=10, Z=10
 - D. X=4, Y=20, Z=5
 - E. None of the above
 5. Consider an individual who lives for two periods, working in the last period of life (n_2) and consuming in the first (c_1). The individual can consume in period one by borrowing at the market rate R. The production function and utility function of the individual are given as $y_2 = kn_2$ and $U(c_1, n_2) = \log(c_1) - n_2$. What is the optimal value of n_2 ?
 - A. 1
 - B. $(1+R)/k$
 - C. 0
 - D. $1/k$
 - E. $k/(1+R)$

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6. If a firm is able to increase output without increasing costs, it must:
- Be able to reallocate its output without changing their marginal product per dollar of any output.
 - Have experienced an increase in the price of at least one of its inputs.
 - Not be minimizing its costs.
 - Be operating in an optimal manner
 - Have been using too much of the input with the highest marginal product per dollar and too little of the one with the lowest marginal product per dollar.
7. The cost function of Animal Across Co. is $c(w_1, w_2, y)$. w_1 and w_2 are the wage of factor 1 (X_1) and factor 2 (X_2), respectively; y is output level. If Animal Across Co.'s production function is $y(X_1, X_2) = \text{Max}(4X_1, 5X_2)$, what is the exact cost function of this company?
- $y^*(w_1/4 + w_2/5)$
 - $y^*\text{Min}(w_1/4, w_2/5)$
 - $y^*(w_1/5 + w_2/4)$
 - $w_1/4 + w_2/5$
 - $y^*\text{Max}(w_1/4, w_2/5)$

8. The accompanying table describes the relationship between the number of workers hired by a call center each hour and the number of calls the call center can make each hour. The call center has only 1 telephone. The telephone costs the firm \$5/hour (regardless of how many calls are made), and each worker is paid \$10 per hour.

Calls Per Hour	Number of Telephones Per Hour	Number of Workers Per Hour
1	1	2
2	1	4
6	1	6
16	1	8
22	1	10
24	1	12

Average variable cost is minimized when output is approximately:

- 6 units
 - 16 units
 - 22 units
 - 24 units
 - Indeterminate from the information given
9. Assume TOYOTA is able to practice the third degree price discrimination between the U.S. and the Japan markets. The demand function in the U.S. market is $Q_A=600-3P_A$ and the demand function in the Japan market is $Q_J=1200 - 6P_J$. To maximize its profits, TOYOTA should:
- Charge a higher price in the Japan market
 - Charge the same price in both markets
 - Sell any more in the U.S. market
 - Sell any more in the Japan market
 - Charge a higher price in the U.S. market

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10. A game has two players. Each player has two possible strategies. One is “cooperate” (C), the other is “betray” (B). Each player writes on a piece of paper either a C or B. If both players write C, they both get a payoff of \$1000. If both write B, they both get a payoff of zero. If one player writes C and the other writes B, the cooperating player gets a payoff of X and the betraying player gets a payoff of Y. To betray will be a dominant strategy for both player if
- A. $Y > 1000 > X$
 - B. $Y > X$
 - C. $Y > 0$ and $X < 0$
 - D. $Y = 1000$ and $X < 0$
 - E. $Y > 1000$ and $X < 0$
11. An industry has two firms, each of which produces output at a constant unit cost of \$10 per unit. The demand function for the industry is $Q=1000000/P$. The Cournot equilibrium price for this industry is:
- A. 15
 - B. 3
 - C. 150
 - D. 20
 - E. 40
12. Which of the following statements is NOT true?
- A. In a monopolistic labor market, marginal factor cost is equal to the equilibrium wage rate.
 - B. In monopolistic labor markets, an individual firm faces a positively sloped labor-supply curve.
 - C. The intersection of market labor supply with market labor demand establishes equilibrium in a perfectly competitive labor market
 - D. Assuming a perfectly competitive labor market, a firm selling in a monopolistic product market will have a lower marginal revenue of product curve than a firm in a perfectly competitive product market.
 - E. In a perfectly competitive labor market, an individual firm can hire as many workers as it needs at the equilibrium wage rate.
13. Suppose there are ten people playing cards in a room. One of them wants to smoke a cigar, nine of them dislike the smell of cigar smoke. The smoker values the privilege of smoking at \$6, and each of the other nine people of the room would be willing to pay 60 cents for clean air in the room. The rules governing use of the room state that smoking is not allowed unless everyone agrees to allow smoking. If the rules governing the room instead stated that smoking is allowed unless everyone in the room agrees to prohibit it, then:
- A. The cigar smoker will smoke, and will pay each other occupant 60 cents
 - B. The non-smoking occupants will pay the cigar smoker to not smoke.
 - C. The parties may or may not be able to reach a negotiated agreement depending on the bargaining strength of each.
 - D. The cigar smoker will smoke and not have to pay the other occupants for the external cost.
 - E. The Coase theorem can not solve the problem in this case.

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14. Suppose Joe has a reliable two-year-old Honda Civic that's in excellent condition and that he would be willing to sell for \$13,000. Lauren, who is risk-neutral, is considering whether to buy Joe's car. She's willing to pay \$14,000 for a two-year-old Honda Civic that is reliable and only \$10,000 for one that's not reliable. Lauren cannot tell whether Joe's car is reliable, but she believes that only 20 percent of two-year-old Hondas for sale in the market are reliable and that the other 80 percent are not reliable. To Lauren, Joe's car looks just like every other two-year-old Honda that's for sale. Which of the following statements is NOT true?
- A. Lauren will not buy Joe's Car
 - B. In the long run, the sales price of two-year old Hondas in the market will rise.
 - C. In the long run, the quality of two-year old Honda Civics offered for sale will fall.
 - D. One of "costly-to-fake" examples in this case for Joe is to offer a warranty to pay for major repairs after selling the car.
 - E. None of the above.
15. Suppose a study finds that the income elasticity of demand for a public good is greater than 1. What income tax system should the government consider as a better solution to finance this public good?
- A. Collective
 - B. Regressive
 - C. Progressive
 - D. Proportional
 - E. Negative income tax (NIT)
16. Traditional economic models cannot explain why:
- A. People buy more of certain goods when their income falls.
 - B. People donate money to charity.
 - C. People leave tips at restaurants for dining.
 - D. Some people buy expensive cars and others buy cheap cars.
 - E. Risk-averse people are unwilling to sell stocks when the price falls.
17. In 2020, which of the following country's economic growth is expected to be the best among the four?
- A. Vietnam
 - B. India
 - C. Philippines
 - D. Thailand
18. A typical IS-LM model composes AD, and AS is the aggregate supply curve of the classical school. Analyzing the U.S. economy in the face of Covid-19 in 2020 with the model, which of the following is a correct statement?
- A. The lockdown shifts the AD leftward
 - B. The lockdown moves along the AD upward
 - C. The increased unemployment moves the AS leftward
 - D. The hospitalization of workers does not shift the AS.

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：經濟學【財管系碩士班乙組】

題號：443004

※本科目依簡章規定「不可以」使用計算機(混合題)

共 7 頁第 5 頁

19. In the expenditure approach to the national income accounting, the expenditure is put in 5 categories, C, I, G, X, M. About the spending on education, the personnel, office supplies, equipment, and buildings are supported by the government and tuition paid by students. Choose a correct answer.
- A. the spending by both the government and households belongs to I
 - B. the spending by the government does not count in the national income accounting and the spending by households belongs to I
 - C. the spending by the government belongs to G and the spending by the household does not count in the national income accounting
 - D. the spending by the government belongs to G and the spending by the household belongs to C
20. What is among the reasons for an increase in Taiwan's foreign exchange reserves?
- A. Interest receipts from the foreign exchange reserve invested overseas
 - B. Taiwan's central bank sells U.S. dollar
 - C. more imports
 - D. more exports
21. If a country has very high unemployment rate and the government requires firms cut the hours worked per employee and hire more employees. With the hourly compensation for work remaining the same, what is the effect of the policy?
- A. consumption increases
 - B. consumption remains the same
 - C. consumption falls
22. When the media talks about the U.S. Federal Reserve changing interest rates, the interest rate talked about is
- A. the interest rate charged on banks borrowing from the Federal Reserve
 - B. the interest rate of interbank loans with very short duration
 - C. the 10-year government bond interest rate
 - D. banks' one-year deposit rate
23. A country is at full-employment. Given the expenditure approach to the national income accounting, the expenditure is put in 5 categories, C, I, G, X, M. If it intends to reduce its trade balance, which of the following is not an appropriate policy?
- A. encouraging investment expenditure
 - B. reducing taxes
 - C. encouraging savings
 - D. increasing government spending
24. According to a typical IS-LM model, a country's income will
- A. increase if there is a cut in government spending and an equal rise in autonomous consumption
 - B. decrease if there is a cut in government spending and an equal rise in autonomous consumption
 - C. increase if there is a cut in government spending and an equal cut in lump-sum taxes
 - D. decrease if there is a cut in government spending and an equal cut in lump-sum taxes

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：經濟學【財管系碩士班乙組】

題號：443004

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共 7 頁第 6 頁

25. Which of the following is inconsistent with New Classical School of economics?
- If the government announces its intended tight monetary policy, reducing inflation needs not be at the cost of increased unemployment
 - If expected inflation is not equal to the realized one, the labor market is not at full employment
 - If there are negative shocks to aggregate demand, there is no need for government economic policy to intervene
 - Surprises in monetary policies does not affect the real output

26. Personal income does not include
- capital gains from stock investments
 - interests from bond investments
 - transfer payments from the government
 - rent received
 - retirement pension received

二，填空題：總體經濟部分，共五題，每題 4 分，答案長度請勿超過試題所顯示空格長度

- The balanced budget multiplier is smaller in a typical IS-LM model than in a simple Keynesian model. Why? _____
- The production function is $y = N - N^2/4$, the nominal wage is fixed at W by contract, and there are many unemployed. Let price level be denoted by P . Show the aggregate supply function.

- In a typical IS-LM-BP model, the BP curve of a small country with perfect capital mobility is usually shown as a horizontal line intersecting the vertical axis at the foreign interest rate. What is the assumption made about the exchange rate? _____
- $Y = C_a + \sigma(Y-T) + I + G + X - M$, $X = \theta Y^*$, $M = \beta Y$, where C_a is the autonomous consumption spending, X export, M import, Y^* foreign income, and all the Greeks indicate coefficients. Derive $\Delta(X-M)/\Delta Y^* =$ _____.
- In the year 2020, Taiwan's export growth was relatively good, and possible reasons include A) export of masks and medical supplies B) export of electronic products due to the need for remote work C) good control of Covid-19 and production is not interrupted D) some of China's export markets are lost to Taiwan due to the U.S. trade war against China. Choose one you think is the least important reason and explain why it is the least important
_____.

三，填空題：個體經濟部分，共四題，每題 2.5 分

- There are two local labor markets in a society. Either market has no union. In equilibrium, hourly wage for both markets is \$9 and the employment for market 1 and market 2 are 125 and 75, respectively. If workers in market 1 unionize instead, the wage in market 1 becomes \$12 by negotiation and 25 workers go out of work (the employment becomes 100). In market 2, labor increases by 25 workers from market 1 (the employment becomes 100) and the wage decreases to \$6. Given the information above, the net welfare loss to society will be _____.
- Suppose that the demand for street parking spaces in Kaohsiung is $Q = 140 - p$. Kaohsiung municipal government prices each street parking space at \$20 ($p=20$) and the supply $Q=50$. If every demander has the same probability of finding a street parking space, the consumer surplus that all parking spaces can provide is _____.

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：經濟學【財管系碩士班乙組】

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共 7 頁第 7 頁

3. A village has six residents, each of whom has accumulated savings of \$100. Each villager can use this money either to buy a government bond that pays 15 percent interest per year or to buy a year-old goat, send it onto the common field to graze, and sell it after 1 year. The price the villager gets for the 2-year-old goat depends on the quality of the fleece it grows while grazing on the commons. That in turn depends on the animal's access to grazing, which depends on the number of goats sent to the common field, as shown in the following table:

Number of goats on the common field	Price per 2-year-old goat (\$)
1	125
2	119
3	116
4	113
5	111
6	109

The villagers make their investment decisions one after another, and their decisions are public. The village committee votes to auction the right to graze goats on the common field to the highest bidder. Assuming villagers can both borrow and lend at 15 percent annual interest, the right sells for at auction will be _____.

4. Jamie's marginal utility from muffins and from doughnuts is shown in the accompanying table. Jamie has \$18 in the pocket to allow her to consume muffins and/or doughnuts. The price of each muffin is \$3 and the price of each doughnut is \$2.

Muffins Per Day	Marginal Utility Per Muffin	Doughnuts Per Day	Marginal Utility Per Doughnut
1	45	2	25
2	30	3	16
3	15	4	10
4	8	5	6
6	6	6	4

Within the budget, how much does Jamie need to spend on doughnut to optimize her consumption expenditure? _____

國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

科目名稱：財務管理【財管系碩士班丙組】

— 作答注意事項 —

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液（帶）塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，其後果由考生自行負擔。
- 答案卷（卡）應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶具有通訊、記憶或收發等功能或其他有礙試場安寧、考試公平之各類器材、物品（如鬧鈴、行動電話、電子字典等）入場。
- 試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：財務管理【財管系碩士班丙組】

題號：443002

※本科目依簡章規定「不可以」使用計算機(混合題)

共 5 頁第 1 頁

一、單選題(每題兩分，共 20 分)

1. Which one of the following rights is never directly granted to all shareholders of a publicly held corporation?
 - A. Electing the board of directors
 - B. Receiving a distribution of company profits
 - C. Voting either for or against a proposed merger or acquisition
 - D. Determining the amount of the dividend to be paid per share
 - E. Having first chance to purchase any new equity shares that may be offered
2. Jenner's is a multi-division firm that uses its overall WACC as the discount rate for all proposed projects. Each division is in a separate line of business and each presents risks unique to those lines. Given this, a division within the firm will tend to:
 - A. receive less project funding if its line of business is riskier than that of the other divisions.
 - B. avoid risky projects so it can receive more project funding.
 - C. become less risky over time based on the projects that are accepted.
 - D. have an equal probability with all the other divisions of receiving funding.
 - E. prefer higher risk projects over lower risk projects.
3. If a firm commitment IPO is overpriced then the:
 - A. investors in the IPO may consider suing the underwriters.
 - B. Green Shoe provision will probably be utilized.
 - C. stock price will generally increase on the first day of trading.
 - D. issuing firm is guaranteed to be successful in the long term.
 - E. issuing firm receives less money than it probably should have.
4. Mountain Groves has an unlevered cost of capital of 13.2 percent, a cost of debt of 8.3 percent, and a tax rate of 21 percent. What is the target debt-equity ratio if the targeted cost of equity is 14.5 percent?
 - A. 0.54
 - B. 0.29
 - C. 0.34
 - D. 0.48
 - E. 0.33
5. Lucinda owns a \$1,000 face value convertible bond that matures in six years, has a coupon rate of 6.5 percent, paid annually, and a conversion price of \$17.50. Similar bonds have a current market return of 6.35 percent while the related stock is priced at \$18.03 per share. What is the conversion value of this bond?
 - A. \$1,007.30
 - B. \$1,028.45
 - C. \$996.11
 - D. \$1,030.29
 - E. \$1,000.00

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：財務管理【財管系碩士班丙組】

題號：443002

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共 5 頁第 2 頁

6. You have a \$15,000 portfolio which is invested in Stocks A and B, and a risk-free asset. \$6,000 is invested in Stock A. Stock A has a beta of 1.63 and Stock B has a beta of .95. How much needs to be invested in Stock B if you want a portfolio beta of 1.10?
A. \$8,998.90
B. \$8,333.33
C. \$7,706.20
D. \$7,073.68
E. \$9,419.27
7. Miller Fruit wants to expand and needs \$1.6 million to do so. Currently, the firm has 465,000 shares of stock outstanding at a market price per share of \$32.50. The firm decided on a rights offering with one right granted for each share of outstanding stock. The subscription price is \$28 a share. How many rights are needed to purchase one new share of stock in this offering?
A. 8.14
B. 7.17
C. 8.22
D. 8.63
E. 9.45
8. Jensen's Shipping has total assets of \$694,800 at year's end. The beginning owners' equity was \$362,400. During the year, the company had sales of \$711,000, a profit margin of 5.2 percent, a tax rate of 21 percent, and paid \$12,500 in dividends. What is the equity multiplier at year-end?
A. 1.67
B. 1.72
C. 1.93
D. 1.80
E. 1.86
9. Johnson Tire Distributors has debt with both a face and a market value of \$35,000. This debt has a coupon rate of 6.6 percent and pays interest annually. The expected earnings before interest and taxes are \$8,300, the tax rate is 21 percent, and the unlevered cost of capital is 10.9 percent. What is the cost of equity?
A. 12.46 percent
B. 12.87 percent
C. 14.56 percent
D. 13.59 percent
E. 15.14 percent
10. Carlisle Carpets has cost of goods sold of \$92,511, interest expense of \$4,608, dividends paid of \$3,200, depreciation of \$14,568, an increase in retained earnings of \$11,920, and a tax rate of 21 percent. What is the operating cash flow?
A. \$34,296
B. \$42,122
C. \$36,463
D. \$31,543
E. \$36,741

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：財務管理【財管系碩士班丙組】

題號：443002

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共 5 頁第 3 頁

二、多選題(每題兩分，共 20 分)

11. The expected return on a portfolio:
 - A. can never exceed the expected return of the best performing security in the portfolio.
 - B. must be equal to or greater than the expected return of the worst performing security in the portfolio.
 - C. is independent of the unsystematic risks of the individual securities held in the portfolio.
 - D. is independent of the allocation of the portfolio amongst individual securities.
12. Which one of the following statements is wrong?
 - A. The use of forward rates increases the short-run exposure to exchange rate risk.
 - B. Accounting translation gains and losses are recorded in the equity section of the balance sheet.
 - C. A firm can record a profit on its income statement from a foreign subsidiary even when that subsidiary has no profit thanks to exchange rate risk.
 - D. Unexpected changes in economic conditions are classified as short-run exposure to exchange rate risk.
13. Which one of the following statements is correct concerning the cash cycle?
 - A. The longer the cash cycle, the more likely a company will need external financing.
 - B. Increasing the accounts payable period increases the cash cycle.
 - C. Accepting a supplier's discount for early payment increases the cash cycle.
 - D. The cash cycle can exceed the operating cycle if the payables period is equal to zero.
14. Western Beef Exporters is considering a project that has an NPV of \$32,600, an IRR of 15.1 percent, and a payback period of 3.2 years. The required return is 14.5 percent and the required payback period is 3.0 years. Which one of the following statements correctly applies to this project?
 - A. The net present value indicates accept while the internal rate of return indicates reject.
 - B. Payback indicates acceptance.
 - C. The payback decision rule could override the accept decision indicated by the net present value.
 - D. The payback rule will automatically be ignored since both the net present value and the internal rate of return indicate an accept decision.
15. Which one of the following statements is wrong concerning the relationship between a levered and an unlevered capital structure? Ignore taxes.
 - A. At the break-even point, there is no advantage to debt.
 - B. The earnings per share will equal zero when EBIT is zero for a levered firm.
 - C. The advantages of leverage are inversely related to the level of EBIT.
 - D. EPS are more sensitive to changes in EBIT when a firm is unlevered.
16. Which one of the following statements is wrong?
 - A. A reduction in personal tax rates tends to lead to lower dividends.
 - B. Dividends tend to fluctuate significantly from quarter to quarter.
 - C. Dividend payments are highly concentrated in a relatively small set of large companies.
 - D. Non-dividend-paying companies are generally more apt to commence paying regular dividends than to implement a stock repurchase program.

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：財務管理【財管系碩士班丙組】

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共 5 頁 第 4 頁

17. Which one of the following statements is correct?
- Increasing the time to maturity may not increase the value of a European put.
 - An increase in time increases the value of a call option.
 - Exercising an American option is always more valuable than selling the option.
 - Vega measures the sensitivity of an option's value to the passage of time.
18. Round Dot Inns is preparing a bond offering with a coupon rate of 6 percent, paid semiannually, and a face value of \$1,000. The bonds will mature in 10 years and will be sold at par. Given this, which one of the following statements is wrong?
- The bonds will become discount bonds if the market rate of interest declines.
 - The bonds will pay 10 interest payments of \$60 each.
 - The bonds will initially sell for \$1,030 each.
 - The final payment will be in the amount of \$1,060.
19. Which of the following statements are correct concerning diversifiable risks?
- Diversifiable risks can be essentially eliminated by investing in 30 unrelated securities.
 - There is no reward for accepting diversifiable risks.
 - Diversifiable risks are generally associated with an individual firm or industry.
 - Beta measures diversifiable risk.
20. Which one of the following statements is correct?
- An increase in the earnings per share as a result of an acquisition will decrease the price per share of the acquiring firm.
 - If firm A acquires firm B then the number of shares in AB will equal the number of shares of A plus the number of shares of B.
 - The price-earnings ratio can decrease even when the net present value of a merger is equal to zero.
 - Diversification is one of the greatest benefits derived from an acquisition.

三、計算題 (1-3 題每題 10 分，4-5 題每題 15 分，共 60 分；算到小數點後兩位)

- Assume a firm's debt is risk-free, so that the cost of debt equals the risk-free rate, R_f . Define β_A as the firm's asset beta—that is, the systematic risk of the firm's assets. Define β_E to be the beta of the firm's equity. Use the capital asset pricing model (CAPM) along with M&M Proposition II to show that $\beta_E = \beta_A \times (1 + D/E)$, where D/E is the debt-equity ratio. Assume the tax rate is zero.
- The balance sheet for Sinking Corp. is shown here in market value terms. There are 14,000 shares of stock outstanding.

Cash	53,700	Equity	438,700
Fixed assets	385,000		
Total	\$438,700	Total	\$438,700

- The company has declared a dividend of \$1.30 per share. The stock goes ex dividend tomorrow. Ignoring any tax effects, what is the stock selling for today? What will it sell for tomorrow?(2 分)
- Suppose the company has announced it is going to repurchase \$18,200 worth of stock. What effect will this transaction have on the equity of the firm? (2 分)
- How many shares will be outstanding? (2 分)
- What will the price per share be after the repurchase? (2 分)
- Ignoring tax effects, show how the share repurchase is effectively the same as a cash dividend. (2 分)

試題請隨卷繳回，請留意背面是否有題

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：財務管理【財管系碩士班丙組】

題號：443002

※本科目依簡章規定「不可以」使用計算機(混合題)

共 5 頁第 5 頁

3. Square Hammer Corp. shows the following information on its 2020 income statement: Sales=\$305,000; Costs=\$176,000; Other expense=\$8,900; Depreciation expense=\$18,700; Interest expense=\$12,900; Taxes=\$23,345; Dividends=\$19,500. In addition, you're told that the firm issued \$6,400 in new equity during 2020 and redeemed \$4,900 in outstanding long-term debt.
- (1) What is the 2020 operating cash flow? (2.5 分)
 - (2) What is the 2020 cash flow to creditors? (2.5 分)
 - (3) What is the 2020 cash flow to stockholders? (2.5 分)
 - (4) If net fixed assets increased by \$46,000 during the year, what was the addition to Net Working Capital? (2.5 分)
4. Colosseum Corp. has a zero coupon bond that matures in five year with a face value of \$65,000. The current value of the company's assets is \$62,000, and the standard deviation of its return on assets is 34 percent per year. The risk-free rate is 7 percent per year, compounded continuously. $e^{-0.35}=0.70$
- (1) What is the value of a risk-free bond with the same face value and maturity as the current bond? (3 分)
 - (2) What is the value of a put option on the firm's assets with a strike price equal to the face value of the debt? $N(d1)=0.78$ $N(d2)=0.51$ (3 分)
 - (3) Using the answers from (1) and (2), what is the value of the firm's debt? (3 分)
 - (4) Assume the company can restructure its assets so that the standard deviation of its return on assets increases to 43 percent per year. What happens to the value of the debt? $N(d1)=0.79$ $N(d2)=0.43$ (3 分)
 - (5) What happens to bondholders if the company restructures its assets? What happens to shareholders? (3 分)
5. Consider the following premerger information about a bidding firm (Firm B) and a target firm (Firm T). Assume that both firms have no debt outstanding.

	Firm B	Firm T
Share outstanding	5,300	1,200
Price per share	\$ 44	\$ 16

Firm B has estimated that the value of the synergistic benefits from acquiring Firm T is \$9,300.

- (1) If Firm T is willing to be acquired for \$19 per share in cash, what is the NPV of the merger? (3 分)
- (2) What will the price per share of the merged firm be assuming the conditions in (1)? (3 分)
- (3) In part (1), what is the merger premium? (3 分)
- (4) Suppose Firm T is agreeable to a merger by an exchange of stock. If B offers one of its shares for every two of T's shares, what will the price per share of the merged firm be? (3 分)
- (5) What is the NPV of the merger assuming the condition in (4)? (3 分)

國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

科目名稱：統計學【財管系碩士班甲組、乙組、丙組】

— 作答注意事項 —

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
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國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：統計學【財管系碩士班甲組、乙組、丙組】

題號：443001

※本科目依簡章規定「不可以」使用計算機(選擇題)

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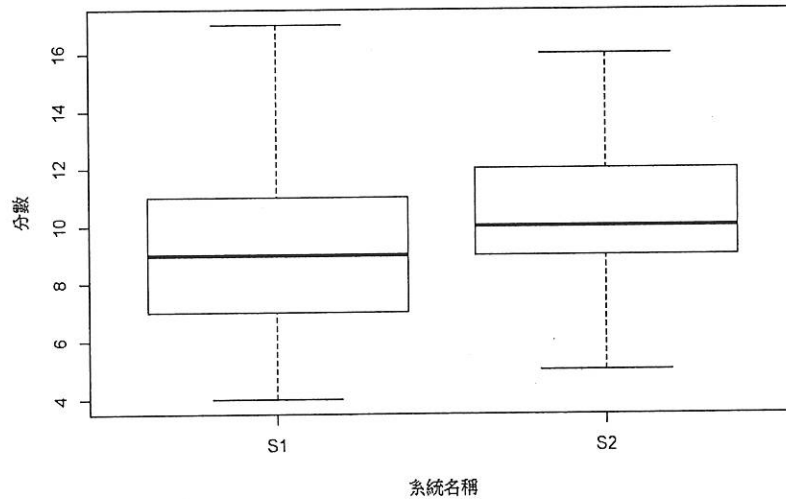
注意事項：各題的計分方式與配分不完全相同，請參考各部份開頭說明。

第一部份：複選題（第 1-6 題，各題彼此獨立，總共 72 分，每題 12 分且各有 5 個選項，每錯一選項扣 3.2 分，得分低於零分或所有選項均未作答者，該題以零分計。）

提醒：關於假設檢定的題目，顯著水準皆為 0.05；若無特別說明，母體皆為常態分配。表格中若出現(??)是指表格原本有這些文字或符號或數據，作答時若有用到需自行判斷或計算。

1. 某銀行想了解顧客對於兩種智慧理財系統 (S1、S2) 的評價，邀請 49 位顧客使用這兩種系統並分別給予評分，每種系統的評分範圍為 0 到 20 分，且評分限定以整數表示。根據評分結果繪製盒鬚圖如圖一，另外使用 R 語言進行 Paired t-test，結果如表一。以下敘述哪些或哪一項正確？(A) S1 分數的全距比 S2 分數的全距大。(B) S1 分數的中位數等於 S2 分數的第一四分位數。(C) 由表一可推算成對樣本差的標準差介於 3.23 與 3.25 之間。(D) (甲)這格數字為 96。(E) 由表一只能推論說：顧客對於 S1 評價未顯著高於 S2，不能推論說：顧客對於 S2 的評價顯著高於 S1。

各系統評分結果盒鬚圖



圖一：用於回答第 1 題

表一：用於回答第 1 題

```

Paired t-test
data: S1 and S2
t = -2.1227, df = (甲), p-value = 0.9805
alternative hypothesis: true difference in means is greater than 0
95 percent confidence interval:
  (??)   Inf
sample estimates:
mean of the differences
-1
    
```

國立中山大學 110 學年度碩士暨碩士專班招生考試試題

科目名稱：統計學【財管系碩士班甲組、乙組、丙組】

題號：443001

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2. 研究者想了解房價與某些變數的關係，設計迴歸模型如下：

$Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \varepsilon_i$ ，其中 i 表示第 i 筆樣本， ε_i 為誤差項，服從常態分配且期望值為 0、變異數具同質性。若 P_i 為房價，應變數 $Y_i = \ln P_i$ ； x_{i1} 與 x_{i2} 皆為自變數而且不是虛擬變數， $x_{i3} = (x_{i2})^2$ ，自變數之間沒有共線性的問題。研究者收集 263 筆資料，每筆資料皆有完整的 P_i 、 x_{i1} 、 x_{i2} 觀察值。使用 R 語言關於迴歸分析的指令得到報表，內容參閱表二（部份數字經四捨五入處理）。以下敘述哪些或哪一項正確？

- (A) (乙) 這格數字為 3。
- (B) 研究者可另外得到迴歸分析對應的 ANOVA 表（不限使用 R 語言），其中 MSE 介於 0.8 與 0.9 之間。
- (C) β_0 估計值可解釋為：應變數之平均數為 16.855。
- (D) β_1 估計值可解釋為：在其它條件不變下，若 x_1 增加 1 單位，則房價減少 7.4%。
- (E) β_2 與 β_3 的檢定結果可解釋為：在控制 x_1 變數下， x_2 對於應變數有邊際遞減效果。

表二：用於回答第 2 題

Coefficients:				
	Estimate	Std. Error	(??)	(??)
(Intercept)	16.855	0.271	62.192	< 2e-16 ***
x1	-0.074	0.029	-2.562	0.011 *
x2	0.289	0.050	5.778	2.16e-08 ***
x3	-0.013	0.00224	-5.959	8.24e-09 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				
Residual standard error: 0.6461 on (??) degrees of freedom				
Multiple R-squared: (??), Adjusted R-squared: 0.1302				
F-statistic: 14.07 on (乙) and (??) DF, p-value: 1.596e-08				

左邊方框數字表示 p-value

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3. 某銀行研究員想了解某些變數與客戶投資基金經驗的關係，使用羅吉斯迴歸 (logistic regression) 進行分析。應變數 Y_i 是二元變數，若 $Y_i = 1$ 表示第 i 位客戶有投資基金的經驗；若 $Y_i = 0$ 表示第 i 位客戶沒有投資基金的經驗。 x_{i1} 與 x_{i2} 皆不是虛擬變數，自變數之間沒有共線性的問題，且：

$$E(Y) = \frac{e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2}}{1 + e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2}}$$

研究者收集 500 筆資料，每筆資料皆有完整的 Y 、 x_{i1} 、 x_{i2} 觀察值。使用 R 語言關於羅吉斯迴歸分析的指令得到報表，內容參閱表三（部份數字經四捨五入處理）。以下敘述哪些或哪一項正確？

- (A) 考慮假設檢定：虛無假設為 $\beta_1 = \beta_2 = 0$ ，對立假設為 β_1, β_2 不全為零，檢定統計量的值介於 1.01 與 1.02。
- (B) 考慮假設檢定：虛無假設為 $\beta_1 = \beta_2 = 0$ ，對立假設為 β_1, β_2 不全為零，檢定統計量服從自由度為 2 的卡方分配。
- (C) β_1 估計值可解釋為：在 x_2 不變的前提下，若 x_1 增加 1 單位，則客戶有投資基金經驗的機率可提升 $e^{0.3565}$ 倍。
- (D) 考慮假設檢定：虛無假設為 $\beta_1 = 0$ ，對立假設為 $\beta_1 \neq 0$ ，檢定統計量服從自由度為 497 的 t 分配。
- (E) β_2 的檢定結果可解釋為：在控制 x_1 變數下， x_2 愈大，則客戶愈可能有投資基金經驗。

表三：用於回答第 3 題

Coefficients:					
	Estimate	Std. Error	(??)	(??)	左邊方框數字 表示 p-value
(Intercept)	0.0865	0.33833	0.256	0.79824	
x1	0.3565	0.12716	2.804	0.00505 **	
x2	0.0341	0.06605	0.516	0.60567	

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					
(Dispersion parameter for binomial family taken to be 1)					
Null deviance: 620.69 on 499 degrees of freedom					
Residual deviance: 612.33 on 497 degrees of freedom					
AIC: 618.33					
Number of Fisher Scoring iterations: 4					

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4. 研究者收集 500 筆資料，每筆皆有完整的 Y_i 、 x_{i1} 、 x_{i2} 、 x_{i3} 、 x_{i4} 觀察值，設計三組迴歸模型分別如下：

$$\text{第一組：} Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \varepsilon_i$$

$$\text{第二組：} Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_3 x_{i3} + \beta_4 x_{i4} + \varepsilon_i$$

$$\text{第三組：} Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \beta_5 (x_{i3} + x_{i4}) + \varepsilon_i$$

其中 i 表示第 i 筆樣本， ε_i 為誤差項，服從常態分配且期望值為 0、變異數具同質性，自變數之間沒有共線性的問題。使用 R 語言關於迴歸分析的指令分別得到報表，這三組模型的判定係數分別為 R_1^2 、 R_2^2 、 R_3^2 。以下敘述哪些或哪一項正確？

- (A) 考慮假設檢定：虛無假設為 $\beta_3 = \beta_4$ ，對立假設為 $\beta_3 \neq \beta_4$ ，檢定統計量服從自由度為 1 與 495 的 F 分配。
- (B) 考慮假設檢定：虛無假設為 $\beta_3 = \beta_4$ ，對立假設為 $\beta_3 \neq \beta_4$ ， R_1^2 與 R_2^2 可用於計算檢定統計量的值。
- (C) 考慮假設檢定：虛無假設為 $\beta_3 = \beta_4 = 0$ ，對立假設為 β_3 、 β_4 不全為零，檢定統計量服從自由度為 1 與 495 的 F 分配。
- (D) 考慮假設檢定：虛無假設為 $\beta_3 = \beta_4 = 0$ ，對立假設為 β_3 、 β_4 不全為零， R_2^2 與 R_3^2 可用於計算檢定統計量的值。
- (E) 本題以上各項敘述皆有誤。

5. 研究者設計迴歸模型如下： $Y_i = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} + \varepsilon_i$ ，其中 i 表示第 i 筆樣本， ε_i 為誤差項，服從常態分配且期望值為 0、變異數具同質性，自變數之間沒有共線性的問題。若以最小平方方法估計參數，接著作後續檢定及分析，以下敘述哪些或哪一項正確？

- (A) 在 95% 信心水準下如果得到 β_1 的雙尾信賴區間為 $[1.36, 1.72]$ ，表示 β_1 有 95% 的機率落在 $[1.36, 1.72]$ 範圍中。
- (B) 在 95% 信心水準下如果得到 β_1 的雙尾信賴區間為 $[1.36, 1.72]$ ，可推得 β_1 的估計值為 1.54。
- (C) 考慮兩組假設檢定：第一組的虛無假設為 $\beta_1 = \beta_2 = 0$ ，對立假設為 β_1 、 β_2 不全為零；第二組的虛無假設為 $\beta_1 = 0$ ，對立假設為 $\beta_1 \neq 0$ 。若不拒絕第一組的虛無假設，則我們也不會拒絕第二組的虛無假設。

【第 5 題選項請繼續看次頁】

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【接續前頁第 5 題選項】

- (D) 考慮兩組假設檢定：第一組的虛無假設為 $\beta_1 = 0$ ，對立假設為 $\beta_1 \neq 0$ ；第二組的虛無假設為 $\beta_2 = 0$ ，對立假設為 $\beta_2 \neq 0$ 。若這兩組的虛無假設皆拒絕，而且第一組得到的 p 值小於第二組得到的 p 值，表示：在解釋應變數 Y 時， x_1 比 x_2 更重要。
- (E) 在應變數 Y 與自變數 x_1 、 x_2 維持相同的前提下加入新的自變數 x_3 ，新模型得到的判定係數 R^2 與修正判定係數 adjusted- R^2 將同時增加。

6. 某雜誌邀請讀者為三家銀行的服務品質進行評比，評比結果如表四所示（僅呈現格式、不呈現完整數據），舉例來說：有 76 位讀者認為 A 銀行服務品質極佳。使用 R 語言關於卡方檢定的指令得到報表，內容參閱表五。以下敘述哪些或哪一項正確？（再次強調：表四中的(??)有實際數據，只是在考題中不呈現。）
- (A) (丙)這格數字為 15。
- (B) 由表五可推論：三家銀行服務品質評比分佈沒有顯著的差異。
- (C) 如果表四中每一個數字皆變為原先的 4 倍，使用改變後的數字進行卡方檢定，則檢定統計量的值為 60.354。
- (D) 如果表四中每一個數字皆變為原先的 4 倍，使用改變後的數字進行卡方檢定，得到的結論是：三家銀行服務品質評比分佈不完全相同。
- (E) 若要分析三家銀行服務品質評比分佈是否一致，也可以就表四實際數據資料，使用雙因子變異數分析未重覆試驗的方式進行分析。

表四：用於回答第 6 題

	服務品質				
	極差	差	尚可	佳	極佳
A 銀行	(??)	(??)	(??)	(??)	76
B 銀行	(??)	(??)	(??)	(??)	65
C 銀行	(??)	(??)	(??)	(??)	85

表五：用於回答第 6 題

Pearson's Chi-squared test

data: x

X-squared = 15.088, df = (丙), p-value = 0.05745

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第二部份：單選題（第 7-13 題，總共 28 分，每題 4 分，答錯倒扣 1.6 分，至多扣至本部份總分為 0 分；未作答者，該題以零分計。）

【題組一，包括第 7-11 題】連續型隨機變數 X 之機率密度函數如下：對所有的實數 x ，

$$f(x) = \frac{e^{-x}}{(1 + e^{-x})^2}$$

7. 期望值 $E(X)$ 是以下何者？

- (A) 不存在 (B) $\sqrt{\pi}$ (C) 1 (D) 0 (E) e^{-1}

8. 令隨機變數 $Y = e^X$ ，對應到 $y > 0$ 的範圍， Y 的機率密度函數是以下何者？

- (A) $\frac{1}{(1+y)^2}$ (B) e^{-y} (C) ye^{-y} (D) $2ye^{-y^2}$ (E) 以上皆非

9. 對應到 $y > 0$ 的範圍， Y 的累積分配函數(cumulative distribution function) $F(y)$ 是以下何者？

- (A) $1 - e^{-y}$ (B) $1 - e^{-y^2}$ (C) $\frac{y}{1+y}$ (D) $(1 + y)e^{-y}$ (E) 以上皆非

10. 令隨機變數 $W = F(Y)$ ，變異數 $\text{Var}(3W)$ 是以下何者？

- (A) 4.5 (B) 3 (C) 9 (D) 2.25 (E) 0.75

11. 期望值 $E(Y)$ 是以下何者？

- (A) 2 (B) $\Gamma(1.5)$ (C) 1 (D) 不存在 (E) 以上皆非

【題組二，包括第 12-13 題】 X, Y, Z 皆為連續型隨機變數，聯合機率密度函數如下：

$$f(x, y, z) = \begin{cases} 48xyz & \text{if } 0 < x < y < z < 1 \\ 0 & \text{otherwise} \end{cases}$$

12. 當 $0 < y < 1$ 時， Y 的邊際機率密度函數 $f(y)$ 是以下何者？

- (A) $6y(1 - y)$ (B) $6y(1 - y^2)^2$ (C) $6y^5$ (D) $2y$ (E) $12y^3 - 12y^5$

13. 當 $0 < z < 1$ 時， Z 的邊際機率密度函數 $f(z)$ 是以下何者？

- (A) $6z(1 - z)$ (B) $6z(1 - z^2)^2$ (C) $6z^5$ (D) $2z$ (E) $12z^3 - 12z^5$

【試題至此全部結束，以下無其他試題】